REMARKS

Claim 12 is rejected under 35 U.S.C. 102(e) as being anticipated by Morita (United States Publication Number 2002/0196243 A1). Claims 1-11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Morita and Tajima, *et al.* (United States Patent Number 6,249,265). In view of the amendments to the claims and the following remarks, it is submitted that the claims are allowable over the cited references. Accordingly, reconsideration is respectfully requested.

Independent claim 1 is amended herein to clarify that a super twisted nematic (STN) liquid crystal display (LCD) driver that drives an STN LCD comprises a liquid crystal polarity inversion signal generator, which selects one of a sub frame flag signal and an N line flag signal in response to a selection signal, and further selects a frame flag signal which inverts a level of a liquid crystal polarity inversion signal in the frame, and generates the liquid crystal polarity inversion signal to invert a polarity of an STN liquid crystal of the STN LCD.

Independent claim 5 is amended herein to clarify that a driving method of a super twisted nematic (STN) liquid crystal display (LCD) driver that drives an STN LCD comprises selecting one of a sub frame flag signal and an N-line flag signal in response to a selection signal, and further selecting a frame flag signal which inverts a level of a liquid crystal polarity inversion signal in a frame, and generating the liquid crystal polarity inversion signal that inverts a polarity of an STN liquid crystal of the STN LCD in the frame.

Independent claim 9 is amended herein to clarify that a driving method of a super twisted nematic (STN) liquid crystal display (LCD) driver that drives an STN LCD comprises generating a liquid crystal polarity inversion signal in a frame that inverts a polarity of an STN liquid crystal of the STN LCD if the number of sub frames in the frame is n.

Independent claim 12 is amended herein to clarify that a driving method of a super twisted nematic (STN) liquid crystal display (LCD) driver uses an nFRC method, wherein n is a natural number, and wherein a polarity of an STN liquid crystal is inverted in each frame.

These features of the present invention as claimed in amended independent claims 1, 5, 9,

and 12 are illustrated by way of example at least at Figures 5-7 of the specification as filed. In this example, an STN LCD driver 500 comprises a sub frame counter 510, an N clock counter 520, a frame counter 530, and a liquid crystal polarity inversion signal generator 540 (see Figure 5 of the specification as filed).

The sub frame counter 510 generates a sub frame flag signal SFFLAG every time each sub frame is counted in a frame (see page 7, lines 18-20 of the specification as filed; see also Figures 2-3, which illustrate waveforms that are generated according to a conventional nFRC method). The N clock counter 520 receives an N-line signal NS, counts the number of N lines, and generates an N-line flag signal NLFLAG every time N lines are counted, wherein a frame is divided into N sub frames (see page 7, lines 21-24 and page 8, lines 25-30 of the specification as filed; see also Figure 4, which illustrates waveforms generated according to a conventional N-line inversion method). If the STN LCD is driven by a conventional nFRC method, the liquid crystal inversion signal M is inverted at each sub frame (see Figures 2 and 3, page 2, lines 25-26 and page 9, lines 17-19 of the specification as filed). If the STN LCD is driven by a conventional N-line inversion method, one frame is divided into N sub frames, and the liquid crystal inversion signal M is likewise inverted at each sub frame (see Figure 4 and page 3, lines 29-31 and page 9, lines 20-22 of the specification as filed).

However, in the present invention, the liquid crystal polarity inversion signal generator 540 selects either the N-line flag signal NLFLAG (corresponding to an N-line inversion method) or the sub frame flag signal SFFLAG (corresponding to the nFRC method) in response to a selection signal MSEL. Moreover, the frame counter 530 receives a frame rate control (FRC) selection signal FRCSEL, counts a number of the sub frame flag signals SFFLAG, and generates a frame flag signal FFLAG each time the number of sub frame flag signals SFFLAG is n, wherein n refers to a number of sub-frames in a frame (see page 7, lines 25-28 of the specification as filed). For example, if three sub frame flag signals SFFLAG are generated, the frame counter 530 generates one frame flag signal FLLAG, that is, the frame counter 530 generates a frame flag signal FFLAG in each frame (as distinguished from each sub frame) (see page 9, lines 10-12 of the specification as filed). In this manner, the liquid crystal polarity inversion signal generator 540 selects the frame flag signal FFLAG, which inverts the level of the

liquid crystal polarity inversion signal M in each frame (as distinguished from each sub frame) (see Figures 6 and 7 and page 9, lines 11-12, 27-28 of the specification as filed). In this example, the level of the liquid crystal polarity inversion signal M is inverted every three sub frames, i.e., each frame, when a 3FRC method is selected (see Figure 6), instead of being inverted every sub frame as with a conventional 3FRC method (see Figure 2) or 4FRC method (see Figure 3), and the liquid crystal polarity inversion signal M inverts the polarity of the liquid crystal (see Figure 6, page 10, lines 21-26, and page 12, lines 19-22 of the specification as filed).

With regard to the rejection of independent claim 12 under 35 U.S.C. 102(e) based on Morita, it is submitted that Morita fails to teach or suggest a driving method of a super twisted nematic (STN) liquid crystal display (LCD) driver using an nFRC method, wherein a polarity of an STN liquid crystal is inverted in each frame, as claimed in independent claim 12. For reasons stated in the previous response entitled "Amendment A," filed on December 4, 2006 in response to the previous Office Action dated July 3, 2006, Morita fails to teach or suggest a super twisted nematic (STN) liquid crystal display (LCD) driver, as claimed in claim 12. Instead, Morita discloses an active matrix type liquid crystal panel using thin-film transistor (TFT) liquid crystal (see Morita, page 3, paragraph [0063]). It is known to one of ordinary skill in the art that an active matrix TFT liquid crystal display (LCD) as disclosed in Morita is very different from an STN liquid crystal display (LCD), as claimed in independent claim 12. In fact, Morita at pages 14-15, paragraphs [0289] - [0291] explicitly discloses that a liquid crystal panel using STN liquid crystal cannot be applied to a liquid crystal panel using TFT.

Additional differences between an STN LCD and TFT LCD are described in the reference entitled *Liquid Crystal in Displays*, which is cited in the Supplemental Information Disclosure Statement filed concurrently with the current amendment. In particular, the cited reference describes "cross-talk" being "eliminated by the TFT, and thus, there is no point in combining TFT with STN." In other words, cross-talk is not known to be an issue with TFT. On the other hand, the specification as filed refers to an STN LCD driving method using an nFRC method as having a disadvantage of cross talk occuring (see page 4, lines 6-7 of the specification as filed). That is, unlike TFT, cross-talk is an issue with conventional STN LCD driving methods. The present invention, however, prevents cross-talk from occurring in an STN LCD driving method

(see page 13, lines 18-22 of the specification as filed).

In addition, there is no teaching or suggestion in Morita of a super twisted nematic (STN) liquid crystal display (LCD) driver using an nFRC method, wherein n is a natural number, as claimed in amended independent claim 12. Specifically, Applicant finds no teaching or suggestion in Morita of an nFRC method. Instead, Morita refers to an FRC<0:7> signal at page 16, paragraph [0326]). However, the FRC<0:7> signal is a polarity inverting signal. There is no teaching or suggestion in Morita of an nFRC method, as claimed in amended independent claim 12.

In addition, there is no teaching or suggestion in Morita that a polarity of an STN liquid crystal is inverted in each frame, since Morita fails to teach or suggest an STN liquid crystal.

For at least these reasons, Morita fails to teach or suggest the driving method of a STN LCD driver, as claimed in claim 12. Accordingly, reconsideration of the rejection of claim 12 under 35 U.S.C. 102(b) based on Morita is therefore respectfully requested.

With regard to the rejection of claim 1 under 35 U.S.C. 103(a) based on the combination of Morita and Tajima, *et al.*, it is submitted that Morita and Tajima, *et al.*, alone or in combination, fail to teach or suggest a frame counter, which receives a frame rate control (FRC) selection signal, counts a number of sub frame flag signals received from a sub frame counter, and generates a frame flag signal every time the number of the sub frame flag signal counted is n, as claimed in independent claim 1. In addition, it is submitted that Morita and Tajima, et al., alone or in combination, fail to teach or suggest a liquid crystal polarity inversion signal generator, which selects one of the sub frame flag signal and an N-line flag signal in response to a selection signal, and further selects a frame flag signal which inverts a level of a liquid crystal polarity inversion signal in the frame, and generates the liquid crystal polarity inversion signal to invert a polarity of an STN liquid crystal of the STN LCD, as claimed in amended independent claim 1.

Morita teaches a frame counter that counts a frame number (see Morita, page 15, paragraph [0306]), and further teaches that, for each frame, the polarity applied to a liquid crystal capacitor of a TFT is inverted for each frame (see Morita, page 16, paragraph [0312]). However, there is no teaching or suggestion in Morita of the frame counter of Morita being a frame counter

which receives a frame rate control (FRC) selection signal, counts the number of sub frame flag signal received from a sub frame counter, and generates a frame flag signal every time the number of the sub frame flag signal counted is n, as claimed in independent claim 1.

Further, there is no teaching or suggestion in Morita of the frame counter of Morita being a liquid crystal polarity inversion signal generator, which selects one of a sub frame flag signal and an N-line flag signal in response to a selection signal, and further selects a frame flag signal which inverts a level of a liquid crystal polarity inversion signal in the frame, and generates the liquid crystal polarity inversion signal to invert a polarity of an STN liquid crystal of the STN LCD, as claimed in amended independent claim 1. The Office Action at page 4 cites Morita at page 3, paragraph [0063], page 15, paragraphs [0300]-[0308], page 16, paragraphs [0311]-[0317], paragraphs [0326]-[0333], and page 15, paragraphs [0291]-[0297] as teaching a liquid crystal polarity inversion signal generator. However, paragraph [0063] of Morita describes the benefits of a TFT liquid crystal over an STN liquid crystal. Applicants find no mention in the other cited paragraphs of Morita of a liquid crystal polarity inversion signal generator, which generates a liquid crystal polarity inversion signal that inverts a polarity of an STN liquid crystal of the STN LCD in a frame, as claimed in amended independent claim 1.

Additional differences between the frame counter of Morita and the present invention as claimed in claim 1 are described in the previous response entitled "Amendment A," filed on December 4, 2006 in response to the previous Office Action dated July 3, 2006.

As described above, there is no teaching or suggestion in Morita of a liquid crystal polarity inversion signal generator which selects one of a sub frame flag signal and an N-line flag signal in response to a selection signal, and further selects a frame flag signal which inverts a level of a liquid crystal polarity inversion signal in the frame, and generates the liquid crystal polarity inversion signal to invert a polarity of an STN liquid crystal of the STN LCD, as claimed in amended independent claim 1. By way of illustration, Morita does not teach or suggest a liquid crystal polarity inversion signal generator that selects either a sub frame flag signal, for example, sub frame flag signal SFFLAG, which is received by the liquid crystal polarity inversion signal generator 540 if an STN LCD is driven by an nFRC method (see Figures 3 and 5 and page 9, lines 17-19 of the specification as filed), or an N-line flag signal, for example, signal

NLFLAG, which is received by the liquid crystal polarity inversion signal generator 540 if an STN LCD is driven by an N-line inversion method (see Figures 4 and 5 and page 9, lines 20-22 of the specification as filed). Nor is there any teaching or suggestion in Morita of a liquid crystal polarity inversion signal generator that selects a frame flag signal, for example, frame flag signal FFLAG from frame counter 530, which inverts a level of a liquid crystal polarity inversion signal in a frame, and generates the liquid crystal polarity inversion signal to invert a polarity of an STN liquid crystal of the STN LCD, as claimed in amended independent claim 1.

Tajima, *et al.* teaches a frame counter 79 that generates a frame selection signal (FQ) that is connected to a sub-frame sustained discharged sequence pattern storage means 78 (see Tajima, Figure 1 and column 16, lines 40-46). In another embodiment of Tajima, *et al.*, a frame counter 79 selects a number of sub-frames from sub-frame groups (SF1-SFn) to make up one frame (see Tajima, Figure 3 and column 26, lines 23-44). However, neither embodiment of Tajima, *et al.* teaches or suggests that the frame counter 79 of Tajima, *et al.* receives a frame rate control (FRC) selection signal, as claimed in claim 1, or counts the number of the sub frame flag signal received from the sub frame counter, as claimed in claim 1, or generates a frame flag signal every time the number of the sub frame flag signal counted is n, as claimed in claim 1.

Further, there no teaching or suggestion in Tajima, *et al.* of the frame counter of Tajima, *et al.* being a liquid crystal polarity inversion signal generator, which selects one of a sub frame flag signal and an N-line flag signal in response to a selection signal, and further selects a frame flag signal which inverts a level of a liquid crystal polarity inversion signal in a frame, and generates the liquid crystal polarity inversion signal to invert a polarity of an STN liquid crystal of the STN LCD, as claimed in amended independent claim 1.

In addition, it is submitted that neither Morita and Tajima, *et al.* teaches or suggests a sub frame counter, which counts a number of sub frames in a frame in response to a clock signal and generates a sub frame flag signal every time each sub frame is counted in the frame, as claimed in independent claim 1.

Morita fails to teach or suggest a sub frame counter, which counts a number of sub frames in a frame in response to a clock signal and generates a sub frame flag signal every time each sub frame is counted in the frame, as claimed in independent claim 1, for reasons similar to those

described in the previous response entitled "Amendment A," filed on December 4, 2006 in response to the previous Office Action dated July 3, 2006, and for reasons noted in the current Office Action at page 4, first paragraph.

Tajima, *et al.* likewise fails to teach or suggest a sub frame counter, which counts a number of sub frames in a frame in response to a clock signal and generates a sub frame flag signal every time each sub frame is counted in the frame, as claimed in independent claim 1. Tajima, *et al.* discloses a display device that uses a method of intraframe time-division multiplexing, wherein the display device comprises a plasma display (PDP) timing generation circuit 74 that includes a sub-frame counter 72 and sub-frame forming means 73 (see Tajima, Figure 9, column 1, lines 18-23, and column 6, lines 57-59). However, there is no teaching or suggestion of the sub-frame counter 72 of Tajima, *et al.* receiving a clock signal, and therefore, it follows that there is no teaching or suggestion of the sub-frame counter 72 of Tajima, *et al.* counting a number of sub frames in a frame in response to a clock signal, as claimed in independent claim 1. Instead, the sub-frame counter 72 of Tajima, *et al.* receives a SFCLR (sub-frame clear) signal from the sub-frame forming means 73, when a sequence S1, S2, S3 is executed within a sub-frame, wherein the SFCLR signal causes the sub-frame means 73 to start the sub-frame internal drive sequence again (see Tajima, Figure 9 and column 6, line 64 through column 7, line 5). However, there is no teaching or suggestion of the SFCLR signal of Tajima, *et al.* being a clock signal that is received by the sub-frame counter 72 of Tajima, *et al.*, wherein the sub-frame counter 72 counts a number of sub frames in a frame in response to the SFCLR signal.

There is also no teaching or suggestion in Tajima, *et al.* of the sub-frame counter 72 generating a sub frame flag signal every time each sub frame is counted in a frame, as claimed in independent claim 1. Instead, the sub-frame counter 72 generates an selection count value RCA1 signal (see Tajima, Figure 2). While the RCA1 signal is generated for the purpose of sub-frame selection (see Tajima, column 17, lines 43-45), there is no teaching or suggestion that the RCA1 signal of Tajima, *et al.* being a sub frame flag signal that is generated every time each sub frame is counted in a frame, as claimed in claim 1.

In addition, it is submitted that neither Morita and Tajima, *et al.* teaches or suggests a super twisted nematic (STN) liquid crystal display (LCD) driver, as claimed in independent claim 1.

Morita fails to teach or suggest a super twisted nematic (STN) liquid crystal display (LCD) driver, as claimed in independent claim 1, for reasons similar to those described herein with regard to claim 12.

With regard to Tajima, *et al.*, there is likewise no teaching or suggestion in Tajima, *et al.* of a super twisted nematic (STN) liquid crystal display (LCD) driver, as claimed in independent claim 1.

Moreover, assuming arguably that Tajima, *et al.* discloses a super twisted nematic (STN) liquid crystal display (LCD) driver, Applicant submits that, if Tajima, *et al.* discloses a super twisted nematic (STN) liquid crystal display (LCD) driver, the combination of Morita and Tajima, *et al.* is improper under 35 U.S.C. § 103(a) because there is no motivation to one skilled in the art to apply the sub frame counter 72 and frame counter 79 of Tajima, *et al.* to the TFT liquid crystal display of Morita. Morita does not teach or suggest a super twisted nematic (STN) liquid crystal display (LCD) driver; rather, Morita teaches a display control circuit for a TFT liquid crystal display. However, as stated above, according to Morita, a liquid crystal panel using STN liquid crystal cannot be applied to a liquid crystal panel using TFT (see Morita, page 3, paragraph [0063], and at pages 14-15, paragraphs [0289] - [0291]). In addition, as stated above, there is no point in combining TFT with STN, for reasons stated in the cited prior art reference at the section entitled The Active-Matrix (TFT) Liquid Crystal Display, third paragraph. Moreover, the TFT liquid crystal display of Morita teaches away from the super twisted nematic (STN) liquid crystal display (LCD) driver, as claimed, by explicitly stating that the active matrix type liquid crystal panel using TFT liquid crystal is better suitable than STN liquid crystal (see Morita, page 3, paragraph [0063]). For at least these reasons, it follows that one of ordinary skill in the relevant art would in no way be motivated to combine the sub frame counter or frame counter of Tajima, *et al.* with the TFT liquid crystal display of Morita.

In sum, since neither Morita and Tajima, *et al.*, alone or in combination, teaches or

suggests all of the claim limitations of claim 1, and since there is no motivation to make the cited combination, it is submitted that the combination of Morita and Tajima, *et al.* fails to teach or suggest the invention set forth in independent claim 1.

With regard to the rejection of amended independent claim 5, it is submitted that the combination of Morita and Tajima, *et al.* fails to teach or suggest counting a number of sub frames in a frame in response to a clock signal and generating a sub frame flag signal every time each sub frame is counted in the frame, as claimed in amended independent claim 5, for reasons similar to those described above.

In addition, it is submitted that the combination of Morita and Tajima, *et al.* fails to teach or suggest receiving a frame rate control (FRC) selection signal, counting a number of sub frame flag signals received from a sub frame counter, and generating a frame flag signal every time the number of sub frame flag signals counted is n, as claimed in amended independent claim 5, for reasons similar to those described above with regard to claim 1.

In addition, it is submitted that the combination of Morita and Tajima, *et al.* fails to teach or suggest selecting one of the sub frame flag signal and the N-line flag signal in response to a selection signal, and further selecting the frame flag signal which inverts a level of a liquid crystal polarity inversion signal in the frame, and generating the liquid crystal polarity inversion signal that inverts a polarity of an STN liquid crystal of the STN LCD in the frame, as claimed in amended independent claim 5, for reasons at least similar to those described above with regard to claim 1.

With regard to the rejection of amended independent claim 9, it is submitted that the combination of Morita and Tajima, *et al.* fails to teach or suggest generating a liquid crystal polarity inversion signal in a frame that inverts a polarity of an STN liquid crystal of an STN LCD if the number of sub frames in the frame is n, as claimed in amended independent claim 9, for reasons similar to those described above with regard to claims 1, 5, and 12.

It is therefore submitted that Morita and Tajima, *et al.* fail to teach or suggest the invention set forth in the amended claims. Since Morita and Tajima, *et al.* fail to teach or suggest these claimed features, there is no way to combine Morita and Tajima, *et al.* to obtain

teaching or suggestion of the claimed features, and therefore, there is no combination of Morita and Tajima, *et al.* that teaches or suggests the invention set forth in the amended claims.

Since the combination of Morita and Tajima, *et al.* fails to teach or suggest the invention set forth in the amended claims, claims 1-11 and 13 are believed to be allowable over the cited references. Accordingly, reconsideration and removal of the rejection of claims 1-11 and 13 under 35 U.S.C. 103(a) based on the combination of Morita and Tajima, *et al.* are respectfully requested.

In view of the amendments to the claims and the foregoing remarks, it is believed that all claims pending in the application are in condition for allowance, and such allowance is respectfully solicited. If a telephone conference will expedite prosecution of the application, the Examiner is invited to telephone the undersigned.

Respectfully submitted,

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